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# Progress towards the Fielding of Ignition Targets on NIF

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## **Progress towards the Fielding of Ignition Targets on NIF**

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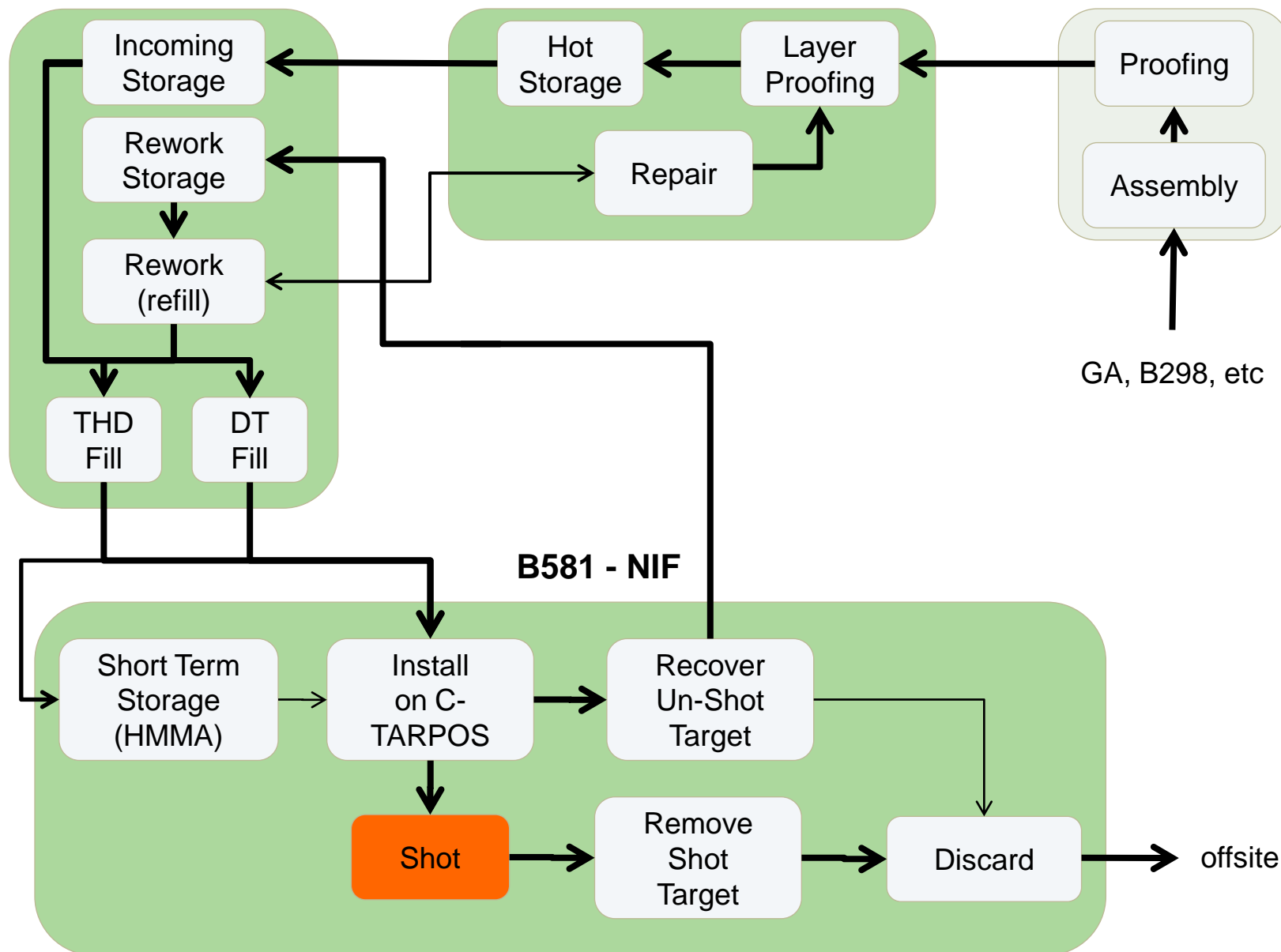
**C. Gibson  
*General Atomics, San Diego, CA 92121***

# Fielding of Ignition targets will require the integrated resources of multiple facilities

## B331 – Tritium Facility

## B298

## B381 – Target Assembly

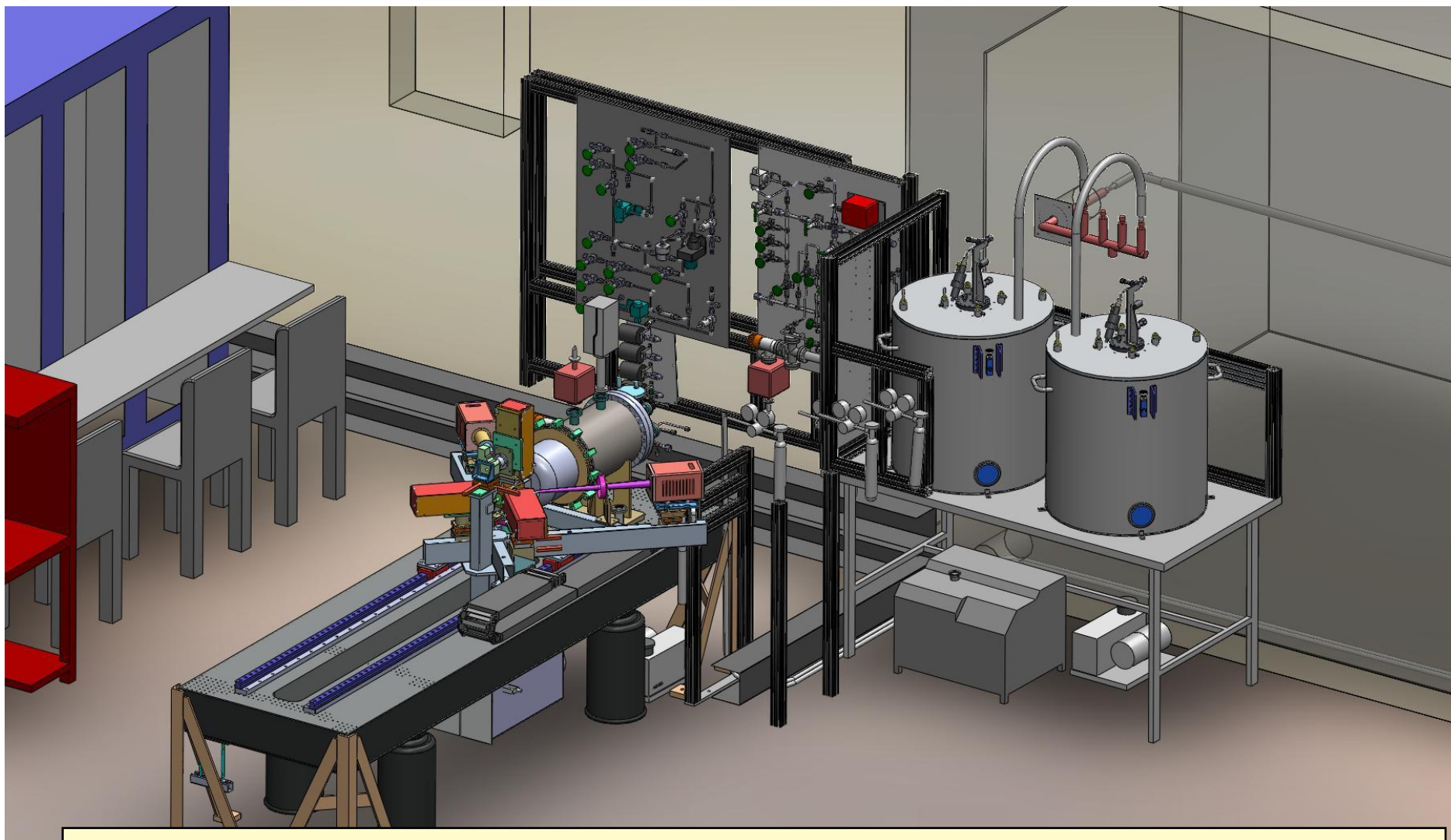


## LLNL final assembly (B381)



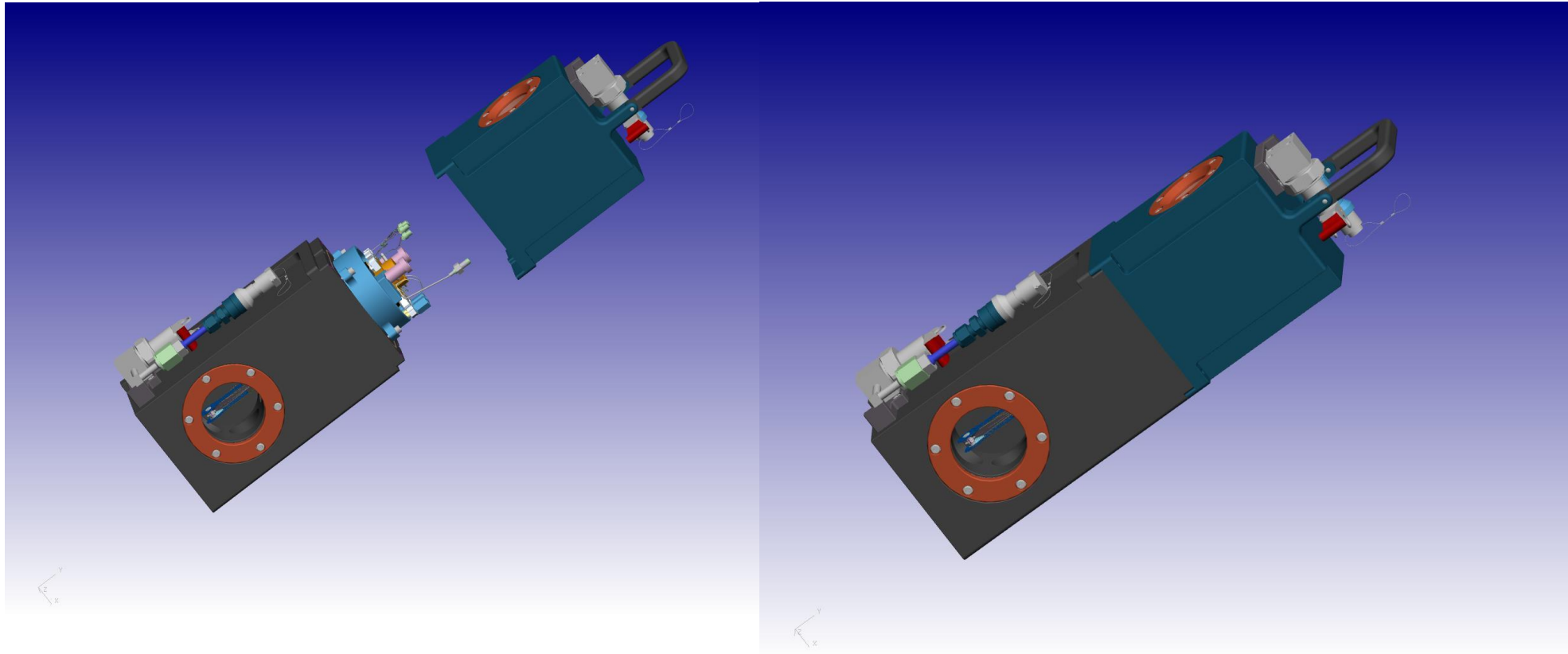


## Ignition target proofing station in B298



**ITPS will ensure that we are able to make acceptable layers in all targets set to NIF and will collect data used to minimize the fielding time in NIF**

# Target transporter



- **Sealed evacuated container**
  - Minimizes diffusion into capsule
  - Minimizes exposure of tents to radiation

## Tritium process station in B331

- LLNL tritium facility now has two systems operating to support NIF
  - Tritium Science Station (TSS) will provide arbitrary mixtures of H,D, and T.
  - Tritium Process Station (TPS) will provide low H and He fills of DT



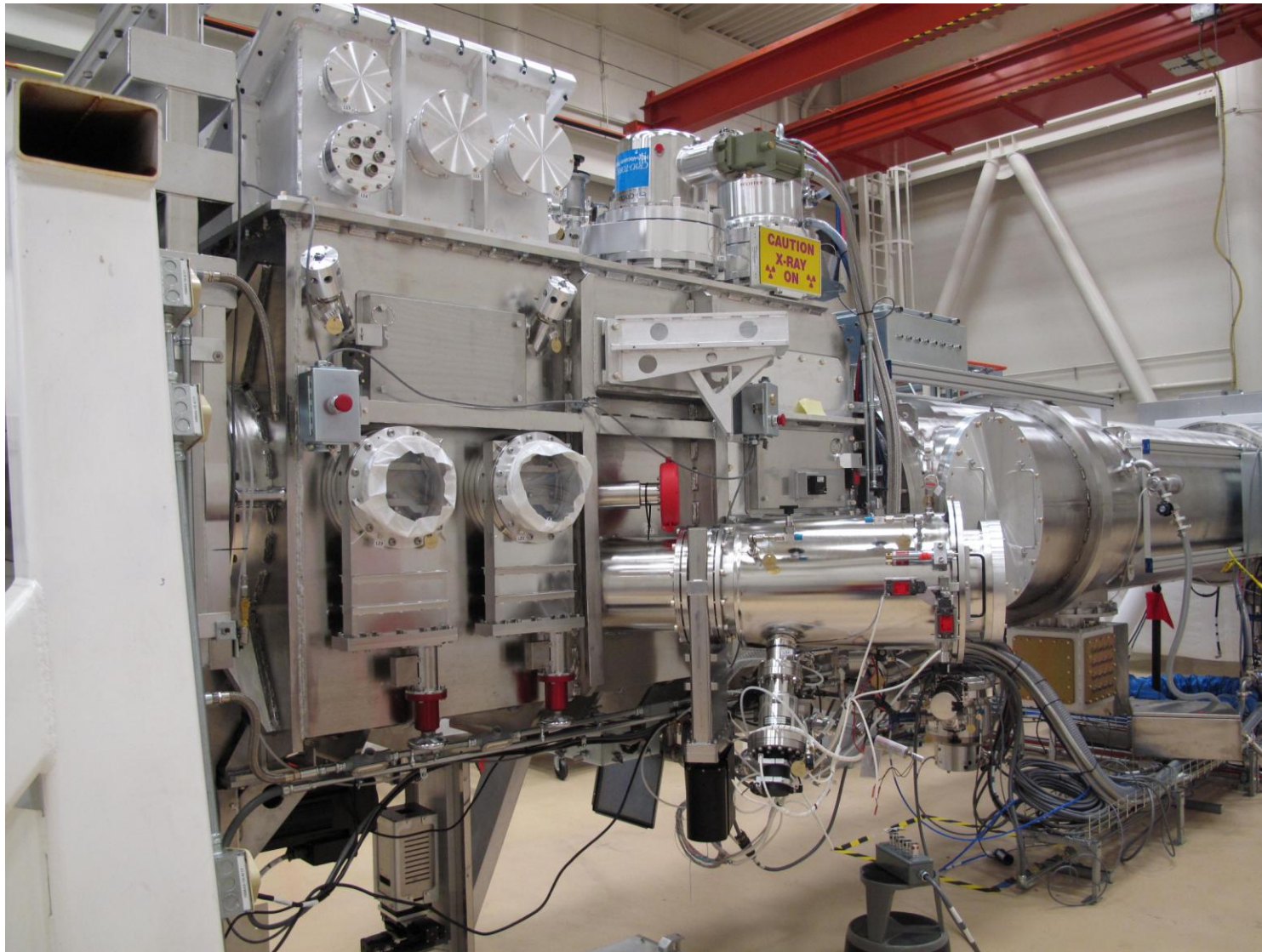


# Cryo Tarpos in B490

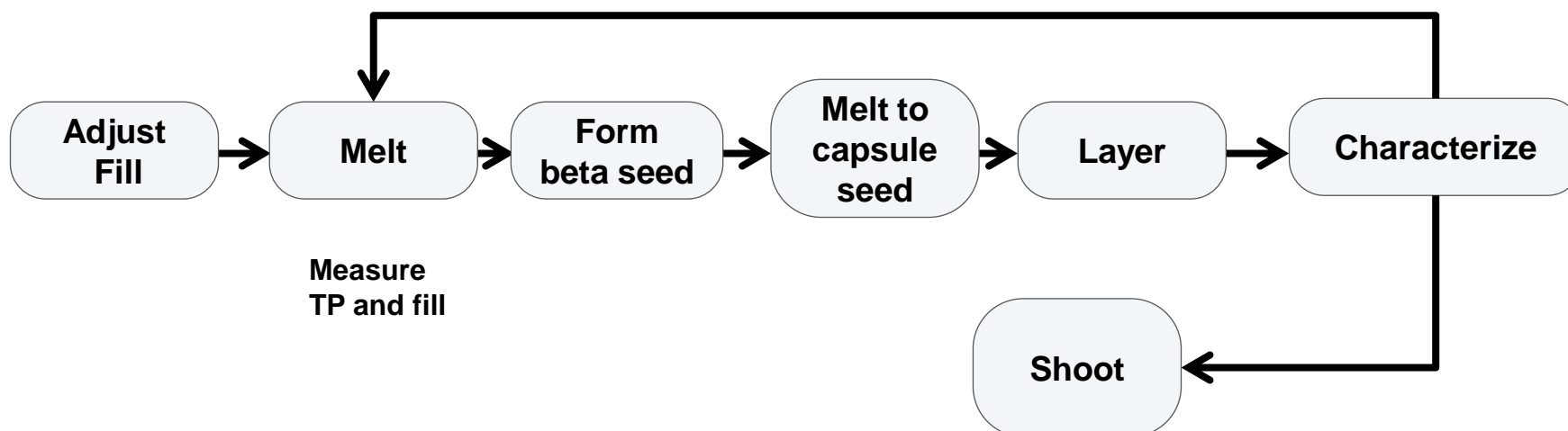
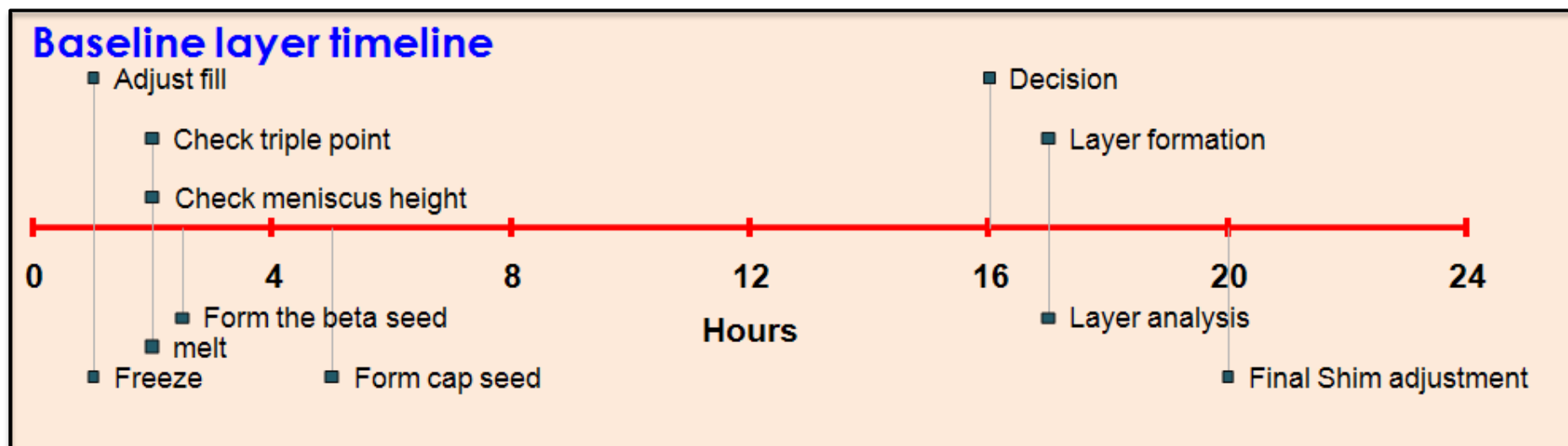




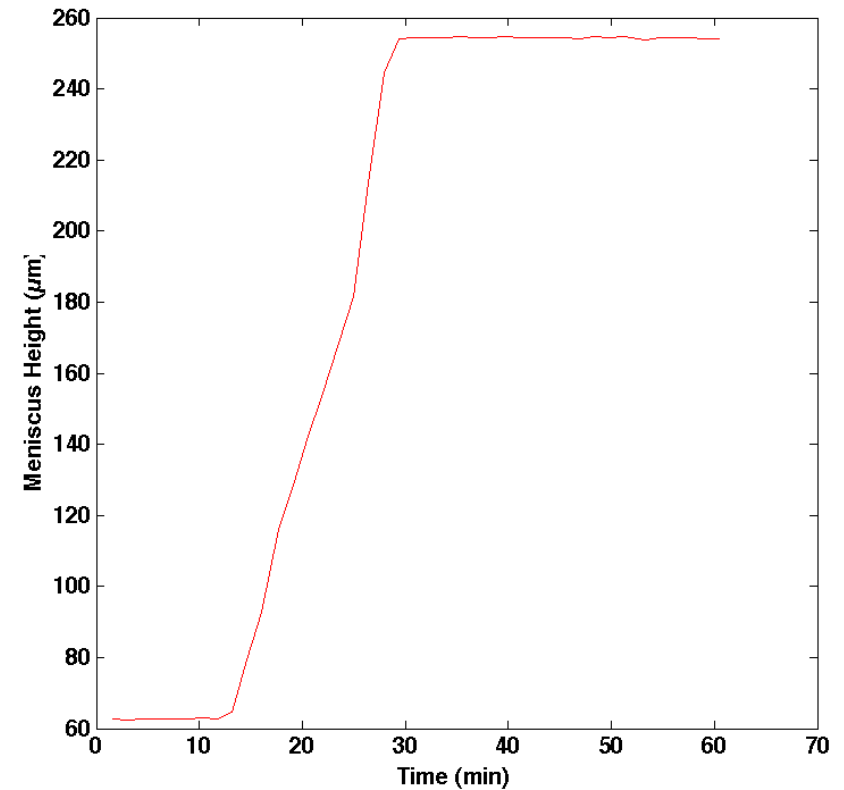
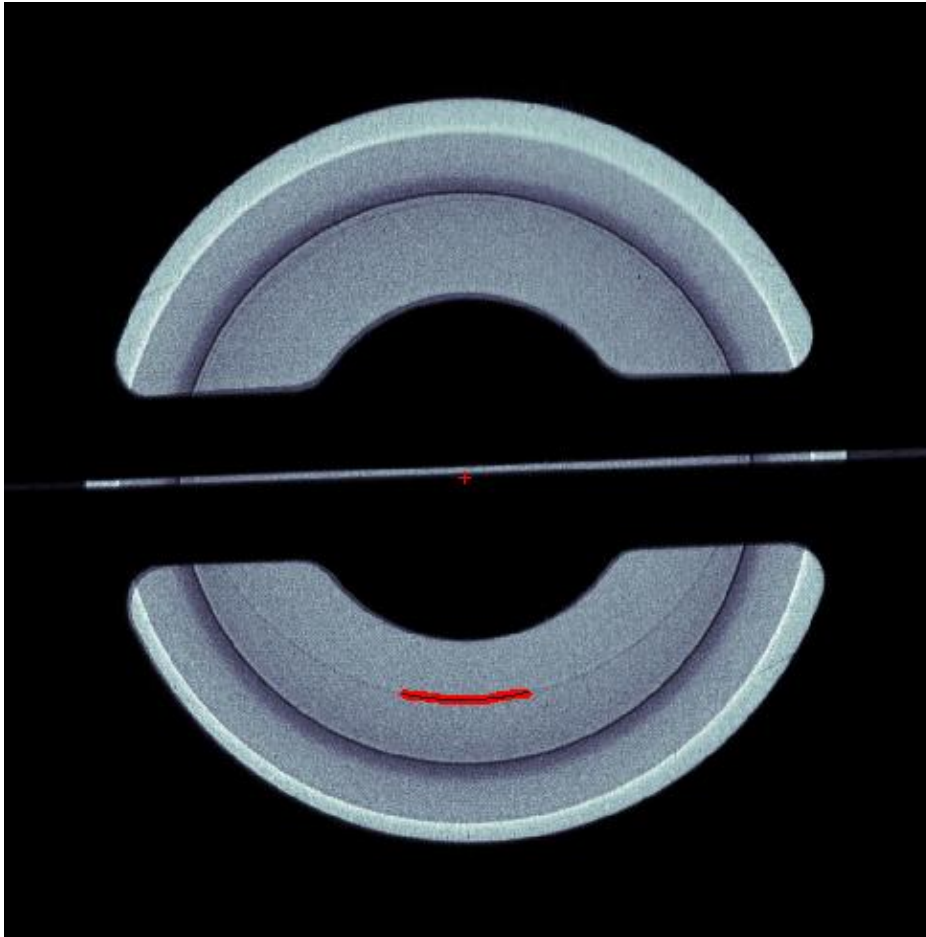
# Cryo-tarpos



# The layer formation timeline

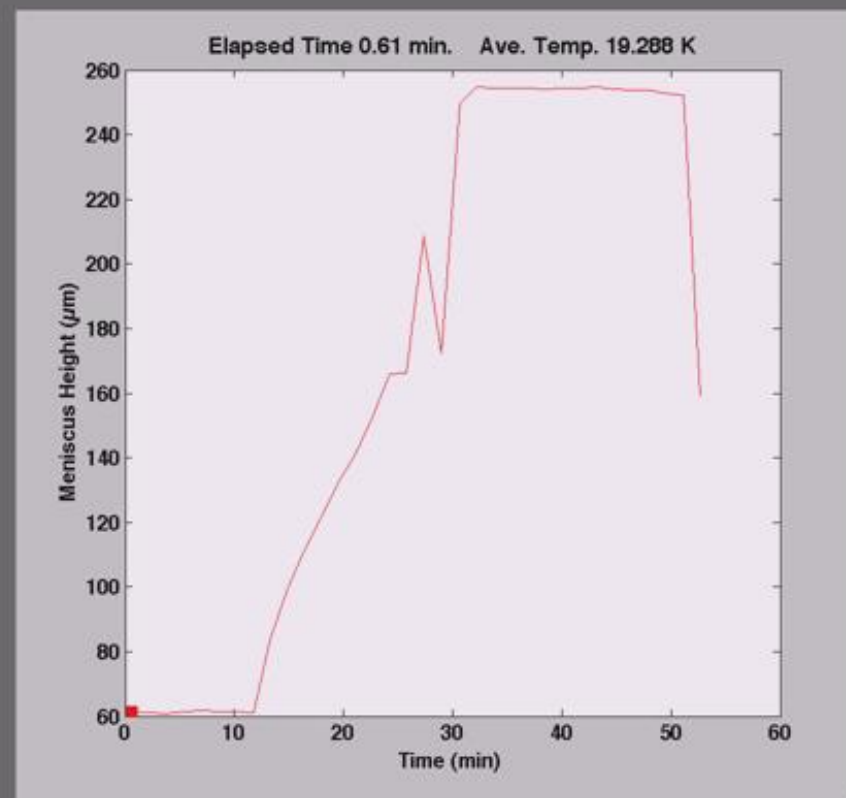
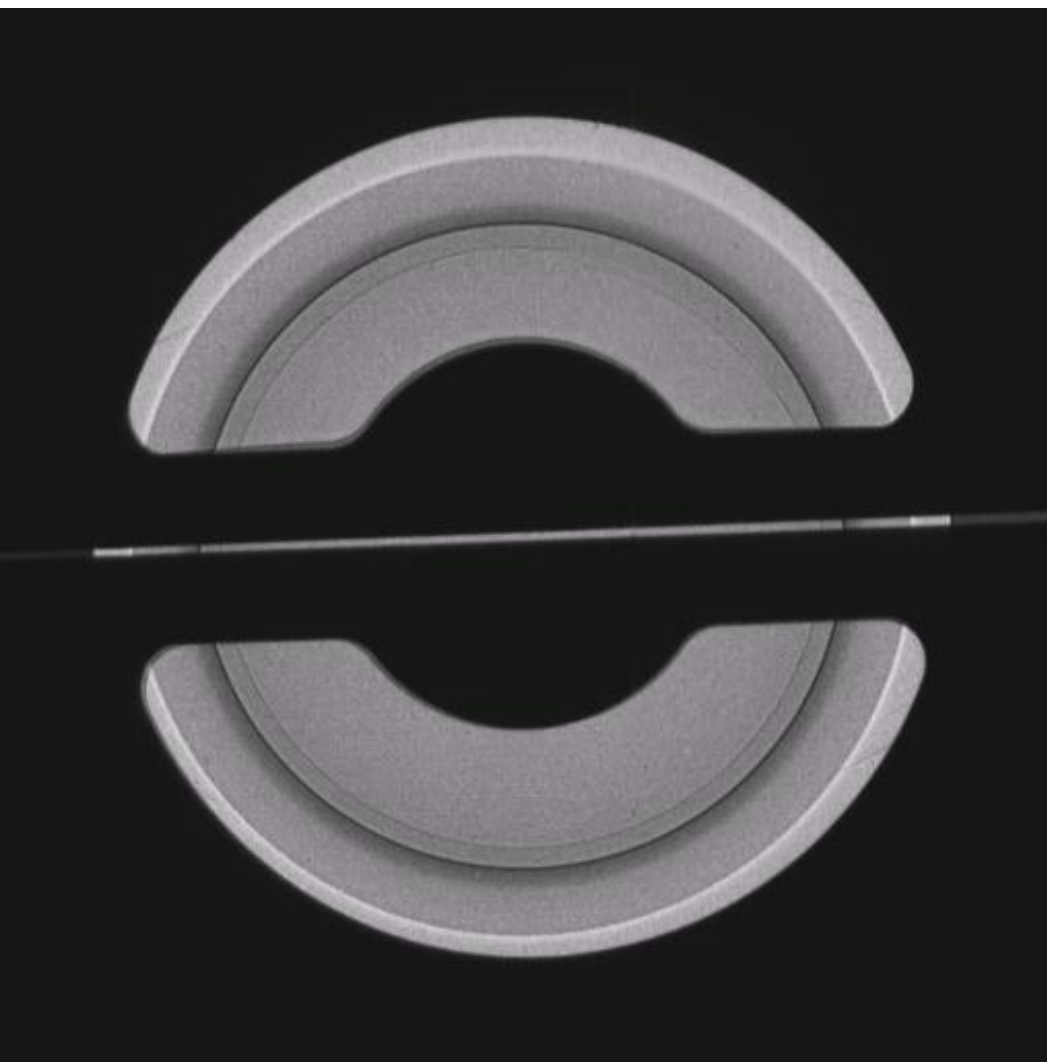


# Measurement of the meniscus height is used to automate several parts of this process



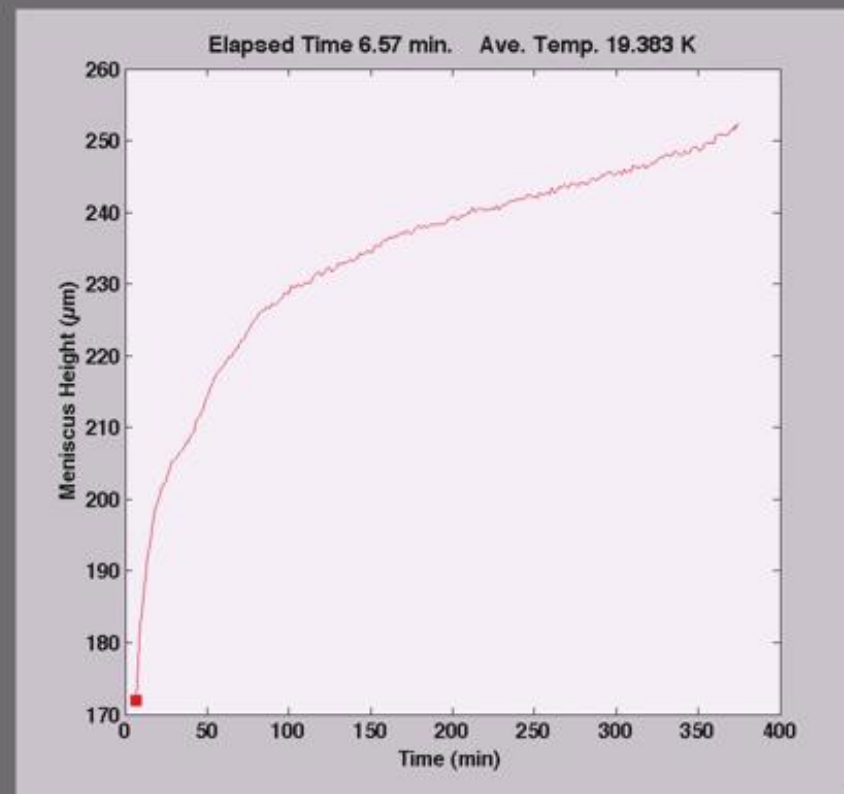
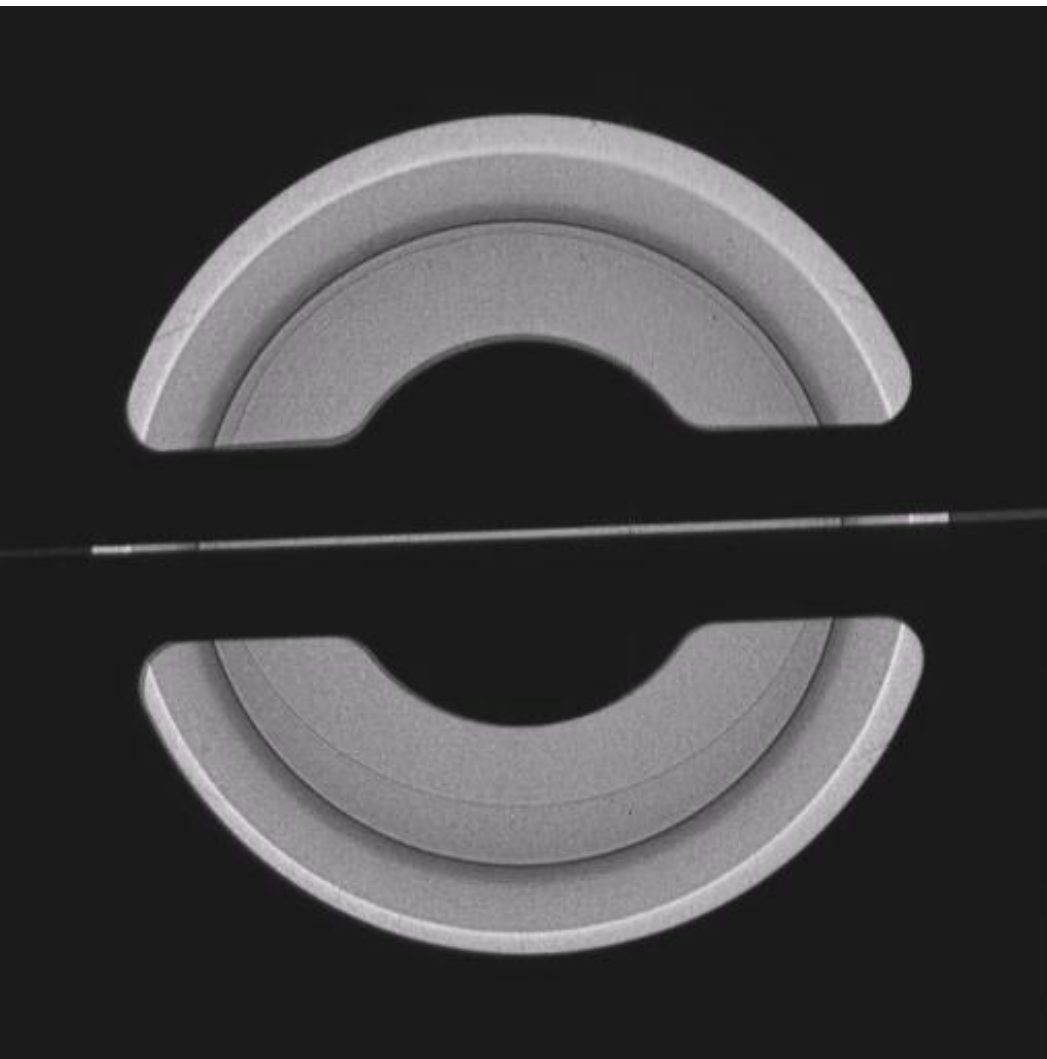


## Melt and Beta seed formation



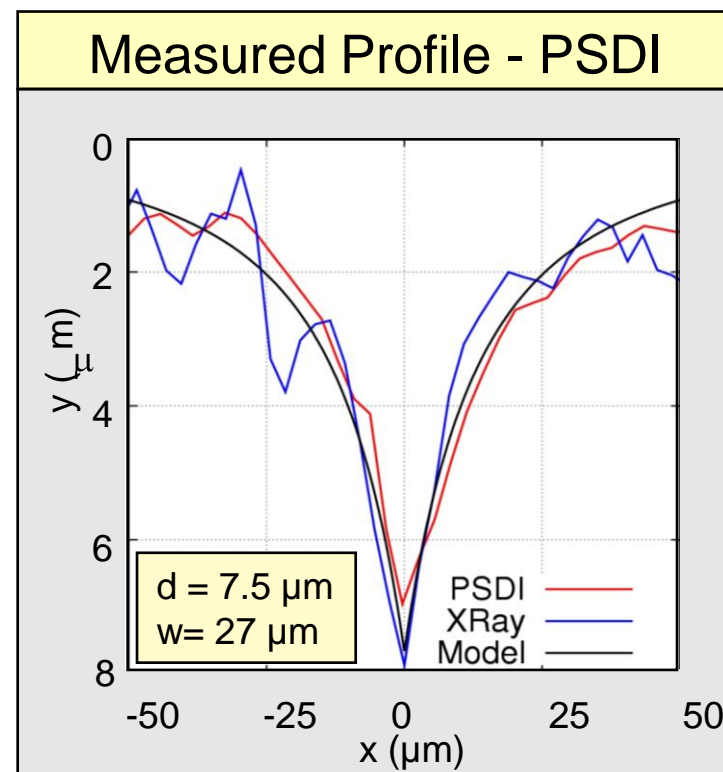
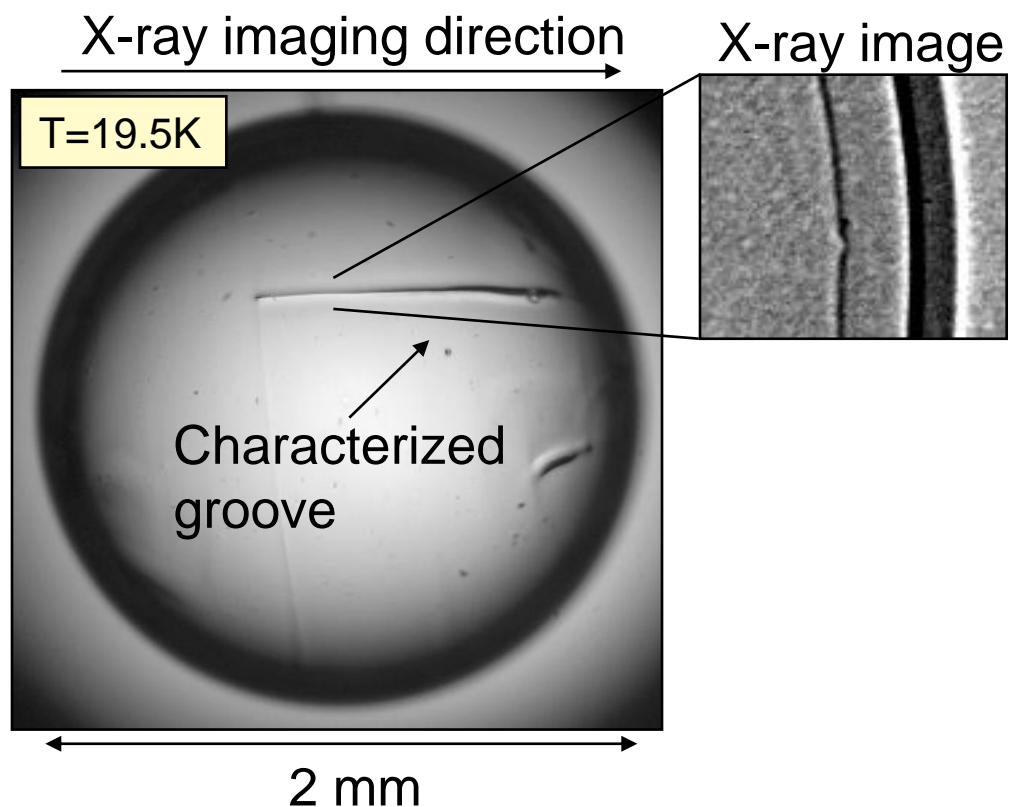
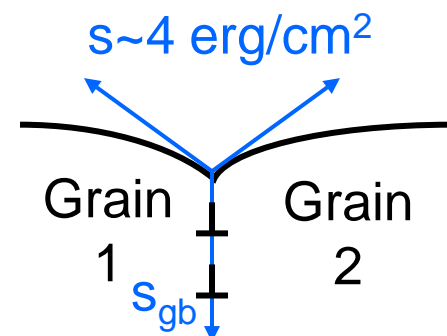
See B. Kozioziemski poster for details of beta phase

# Capsule seed formation

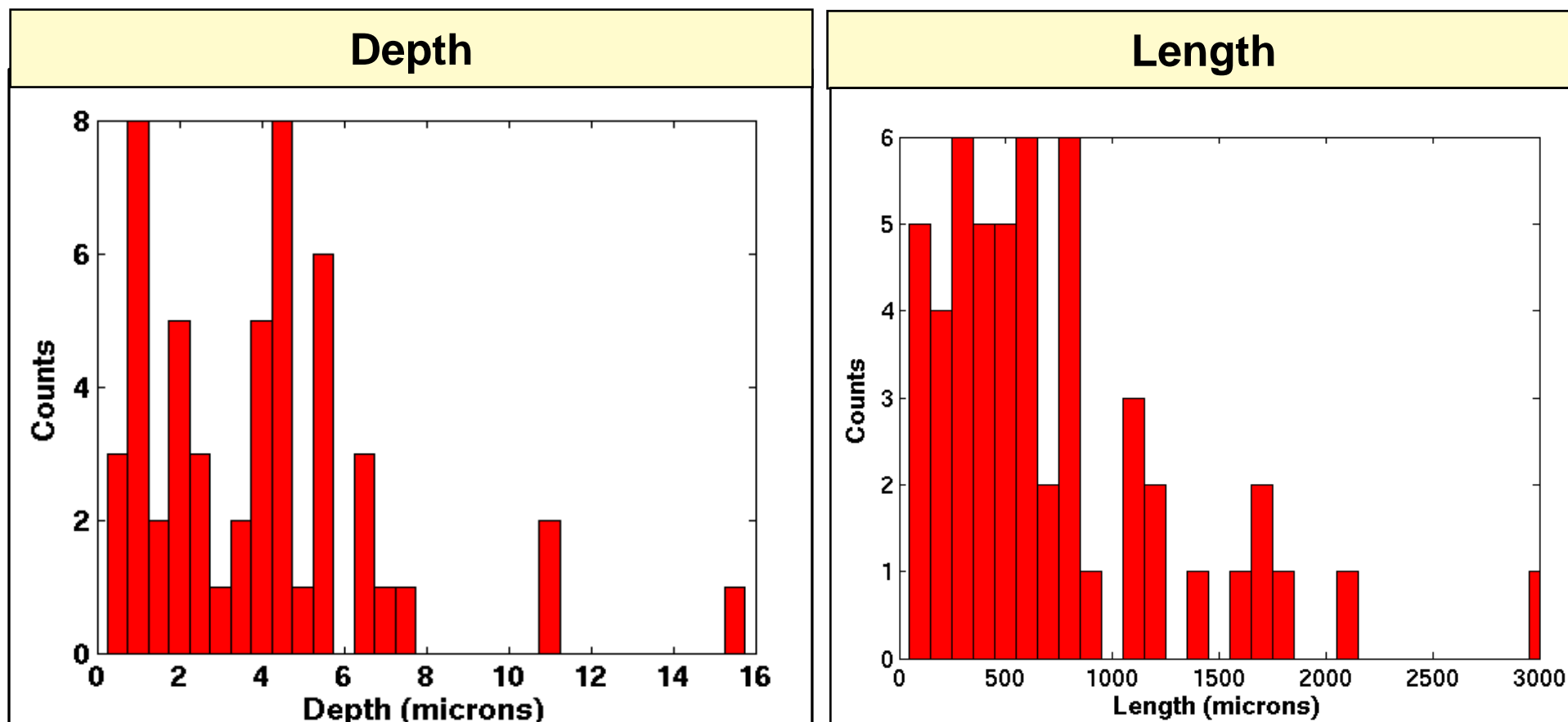


# Local defects are vapor-etched grooves formed at small-angle grain-boundaries

- Groove profile compared to model
  - $y(x) = d/(1+|x|/w)^2$   
 $d$  = groove depth  
 $w$  = 1/2 width



# The distribution of groove lengths, depths, and widths has been characterized by interferometry

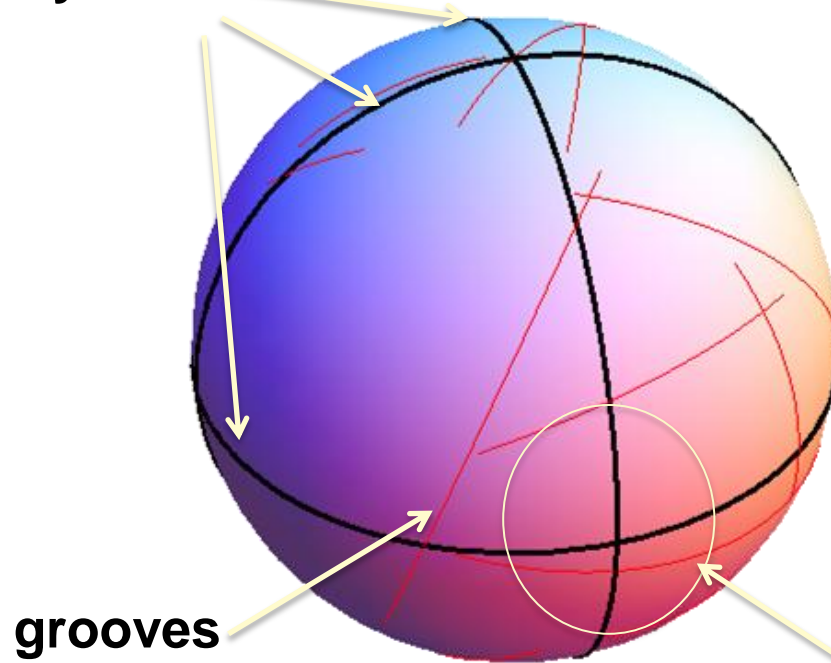




## Grooves

- Estimation of the probability that a given layer meets the K spec and the maximum groove area spec will rely on a statistical evaluation of the probability of a given population of grooves producing the x-ray images seen with that layer.

x-ray views

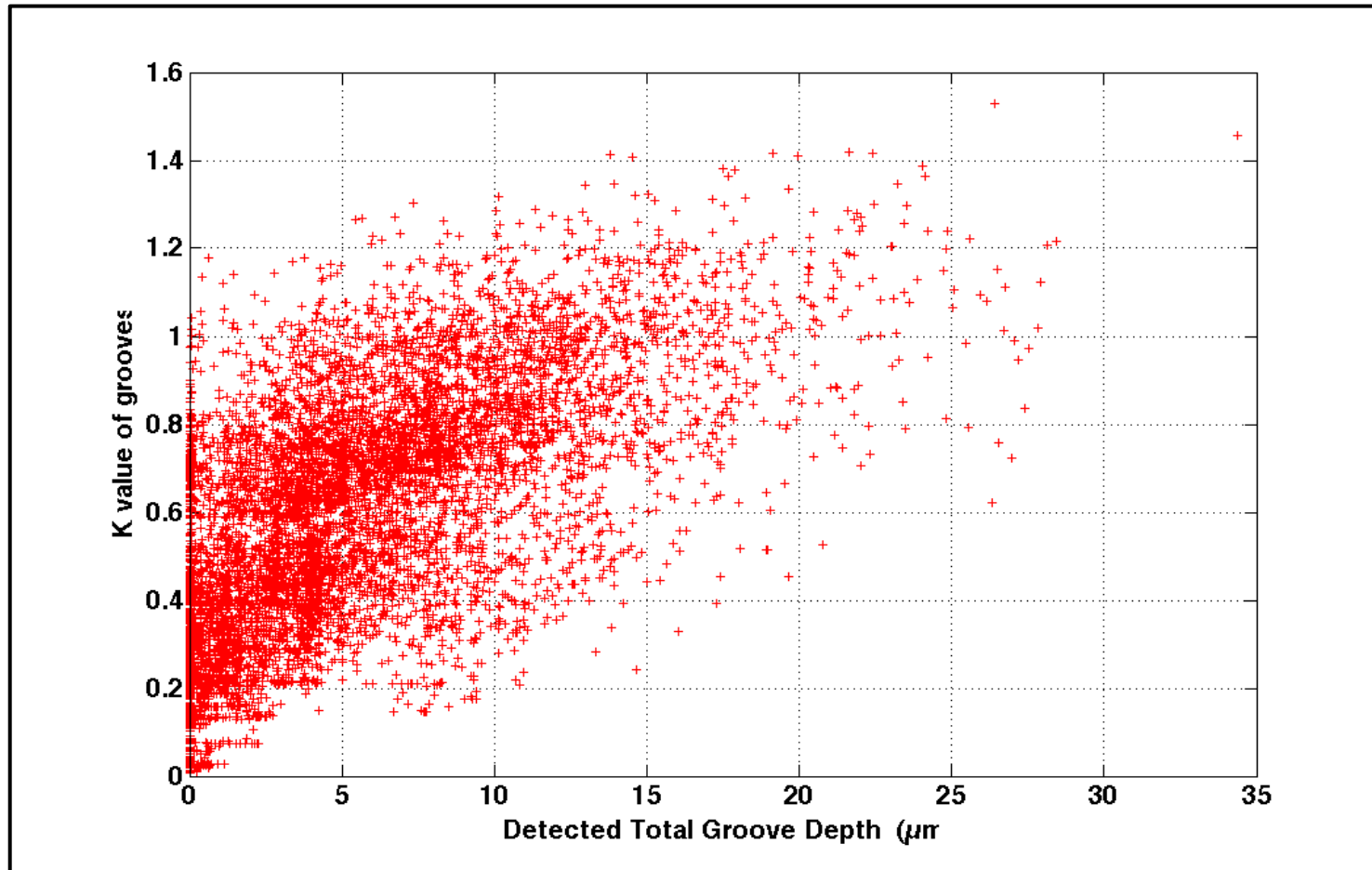


grooves

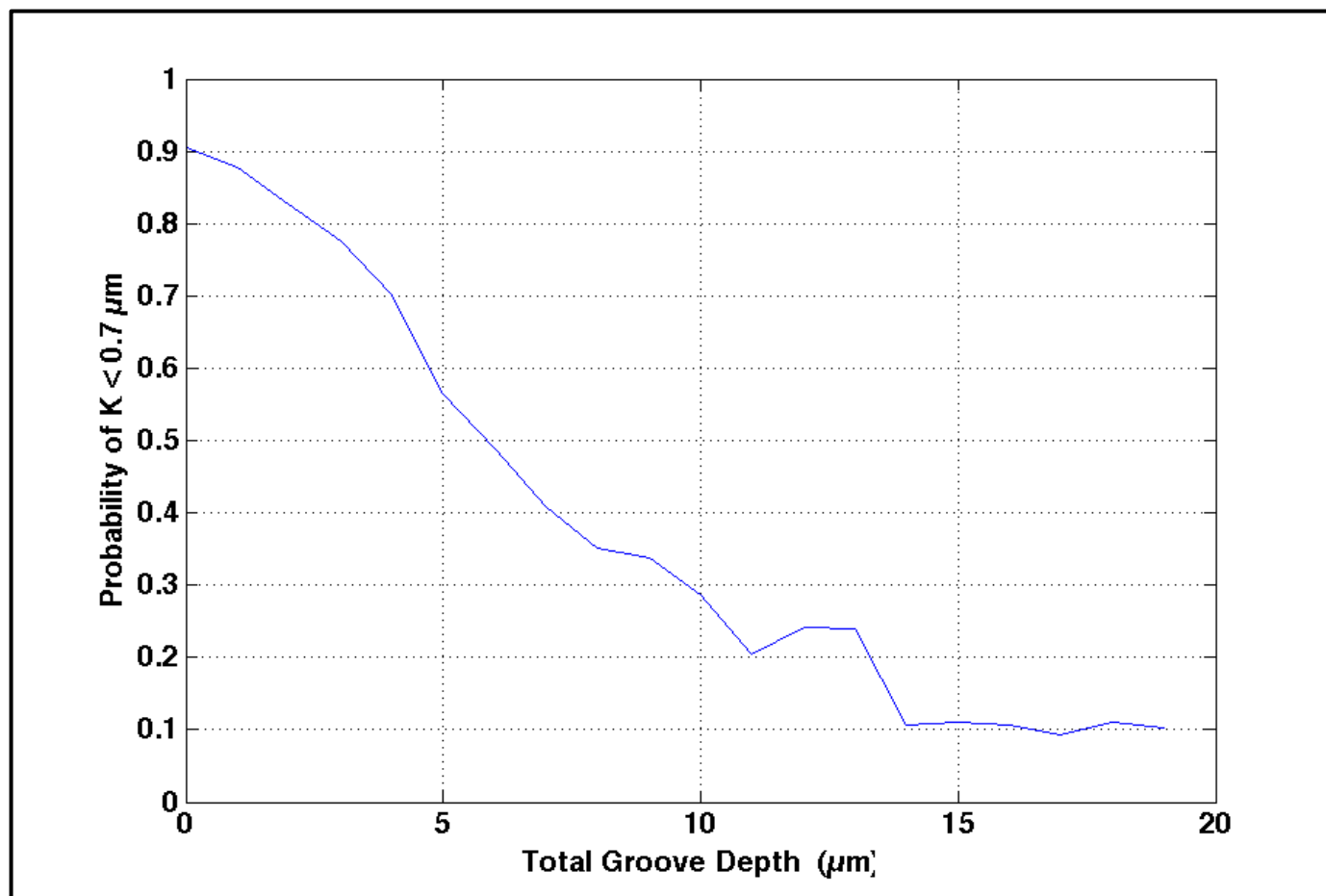
- Grooves from a population characterized by PSDI are randomly place on a sphere and the total depth detected in the three x-ray views is calculated along with the actual K

Area characterized  
by PSDI

# Calculation using the existing set of grooves from alpha seeded layers



## Probability of success



**About 40 % of our current layer have > 70 % probability of meeting spec  
See Oral 17 – J. Sater: Statistics of DT Layer Quality in NIF Targets**

# Summary

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- **All of the infrastructure need to field cryogenic layered targets on NIF is nearing completion**
  - Target Product and Proofing**
  - Tritium Systems**
  - Cryogenic Target Positioner**
- **A baseline layering method has been defined and is in testing**
- **Results indicate that a significant fraction of layers will meet all of the ignition requirements**



# NIC

